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SOME OBSERVATIONS ON THE EXPORT SEASON 1905-6.*

R. Crowe, Superintendent of Exports.

The butter export season now drawing to a close has been both peculiar and interesting. Perhaps never before in the history of the export trade have all the good and bad points of the industry appeared in such bold relief within the one season. The course of supplies and prices, the expectations and fears of the last sixteen years, have all been manifested in this one In short, it may be termed a summary of all the preceding seasons, with promise of a satisfactory ending. At the end of the first three months it appeared certain that we were going to have a record output, but through October and November cold weather prevailed, and these pleasant anticipations were not fulfilled. In fact, production for a time fell behind the output of the year before, notwithstanding the good start made. Then by the middle of January the prospects had once more reached a most promising stage, only to be shattered within a month afterwards owing to the absence of rain. Finally, just when the outlook was very blue—in March—good rains came, and now what may be termed a supplementary season is being enjoyed, and butter is being exported in quantity to Great Britain—a circumstance never before experienced in the month of May. So far, 16,733 tons have been shipped to all destinations since the 1st July, 1905, and it appears certain that by the 30th June this total will have reached 17,200 tons—a record season.

PRICES.

A phenomenal market ruled through the main part of the year. The average c.i.f. value comes out at 107s. 6d., so that £1,849,000 will be the approximate total for the whole season's butter. (The Swanpool and Moorngag Company reports an average price of 112s. 2d. for the season, and doubtless many other leading factories have secured equally satisfactory results.)

From a dairyman's point of view no previous season has proved so profitable, chiefly on account of the abnormally high prices which ruled on

* Paper read at the Thirteenth Annual Conference of the Australasian Butter Factories' Managers Association, held May, 1906, at Melbourne.

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the English market, and the savings effected in transit and marketing. These circumstances alone are responsible for a gain approaching a quarter of a million pounds sterling, a result with which our dairymen cannot but be well satisfied.

THE CHIEF LESSONS.

The season at three periods so full of promise, and on the other hand at times equally desponding, again emphasizes in a most marked manner the necessity for rational feeding and better treatment of dairy cattle. Most of our dairymen are still almost at the mercy of climatic conditions. It rains, and there is plenty of feed and milk; it ceases to rain, the pastures become parched, and the supply is diminished. With a stretch of even moderately dry weather stock die off, all of which prove that there is still great scope for the conservation of water, the growing of green fodders, and the accumulation of reserves against the time of scarcity.

Although some progress has taken place in regard to ensilage, it can hardly be claimed that even the fringe of the subject has been more than touched.

OCEAN TRANSIT.

A duplicate weekly service has been available to shippers since October last, the contract steamers comprising those of the White Star, Aberdeen, and Lund lines, and the mail companies. The rate of freight was only just half of what it had been, and the conditions provided in regard to temperature were better than ever before. Experiments have been conducted with automatic self-registering thermometers. Their utility is patent, and so far everything points to their general adoption. On the steam-ship *Suevic* during her second last voyage one of these instruments was placed in the butter hold. After the fifth day from leaving Melbourne the indicator showed a temperature of 10-12 degrees, which remained constant throughout the voyage. The instrument was set at the London end, and put in the ship's stores cool chamber on the last outward trip, when the record showed a daily rise and fall of many degrees, corresponding exactly with the fluctuations consequent upon the regular opening and use of such a freezing-room. Therefore, from a shipping point of view, the season marks a distinct advance. True, the deliveries in London by the contracting companies were not as regular as could be desired, but it is confidently expected that this will be overcome.

QUALITY.

The quality of the butter exported shows a slight improvement on the previous year, owing to the favorable weather experienced. Not only were abnormal rates realized for choice butters, but even those of an inferior quality brought prices far beyond their relative intrinsic value. My experience is that when this occurs many managers relax their efforts to manufacture up to a high standard. As in previous years, all butter was examined, and its quality noted, prior to export. The following table shows butter classified according to its source, under the heading of "Country Co-operative," "Proprietary and Private," and "Milled and Miscellaneous," "Country Co-operative" meaning the output of co-operative butter factory companies outside the city, "Proprietary and Private" that exported by proprietary companies and private individuals having factories both in the country and city, and "Milled and Miscellaneous" including all nondescript parcels shipped by city exporters.

SEASON 1905–06.

	COUNTRY CO-OPERATIVE.		PROPRIETARY AND PRIVATE.		MILLED AND MISCELLANEOUS.	
Points: Max. 100.	No. of Cases.	Per cent.	No. of Cases.	Per cent.	No. of Cases.	Per cent.
98	52,644					
97	42,543		394		38	
96	39,313		1,807		398	
95	42,700		12,723		3,277	
94	60,661		33,912		5,253	
93	37,076		22,200		4,260	
92	65,386		19,646		2,384	
91	8,365		6,726		851	
90	6,467		12,465		1,137	
Total, 1st Grade	355,155	97·31	109,873	83·52	17,598	51·58
89	2,964		5,376		1,030	
88	1,577		3,697		811	
87	836		2,421		268	
86	913		1,379		980	
85	658		1,492		1,321	
84	335		1,447		810	
83	669		1,901		1,396	
82	637		1,164		1,734	
81	240		623		1,263	
80	69		309		2,136	
Total, 2nd Grade	8,898	2·43	19,809	15·05	11,749	34·44
79	231		631		1,989	
78	240		214		71	
77	126		413		797	
76	59		103		788	
75	152		35		67	
74	23		218		805	
73	...		...		45	
72	35		204		19	
71	...		38		104	
70	...		...		80	
Total, 3rd Grade	866	·23	1,856	1·41	4,765	13·96
69	33		...		...	
68	12		...		...	
Total, Pastry	45	·01	...		...	
Totals ...	364,964		131,538		34,112	

Grand total, 530,614.

CO-OPERATIVE FACTORIES.	PROPRIETARY AND PRIVATE.	MILLED AND MISCELLANEOUS.
Total Cases, 364,964 = 68·78 %	Total Cases, 131,538 = 24·78 %	Total Cases, 34,112 = 6·42 %

Grand total, 530,614.

GRADING AND STAMPING.

Some two seasons ago 22 factories had their butter graded and stamped voluntarily. Last season there were 67 factories, whilst for this, butter factories and exporters representing over 90 per cent. of the output have given written instructions to the Department to grade and stamp their butter for export. From the foregoing table it will be seen that 97.3 per cent. of the country co-operative butters was first grade, 2.43 per cent. second grade, and 0.23 per cent. third grade. Proprietary and private exporters gave a result of 83.52 per cent. first, 15.05 per cent. second, and 1.41 per cent. third grade; whilst milled was down to 51.58 per cent. first, 34.44 per cent. second, and 13.96 per cent. third grade.

Everyone is familiar with the recent controversy regarding this subject of grading. "To grade or not to grade, that is the question." Now, it seems to me that the "Country Co-operative" dairymen have little or no reason to oppose grading, whilst they have everything to gain. The "Proprietary and Private" manufacturers may have grounds for opposition, and it can easily be conceived that those interested in nondescript parcels are naturally against it. That the grading and grade stamping of butter for export has a marked educational influence on manufacturers and producers is evidenced by the experience of New Zealand. Four years ago the percentage of "creamery" butter, first grade, was 95.94 per cent., second 4.0 per cent., and third 0.06 per cent.; whilst "dairy" butter showed first 73.20 per cent., second 25.58 per cent., third 1.2 per cent.; and "milled," first 68.48 per cent., second 30.14 per cent., third 1.38 per cent. Two years ago the quantity of first grade "creamery" butter exported was 97.27 per cent., while for the year ended 31st March, 1906, 98 per cent. of the "creamery" butter was first grade, "dairy" butter showed 82 per cent. first grade, whilst "milled" was down to 70 per cent. This improvement is accentuated when it is remembered that a higher standard is set for the grades each year.

The recent bold effort to secure the aid of country dairymen and butter factories in opposing the extension of grading is very significant. Can any one imagine New Zealand dairymen interested in "creamery" butter taking vigorous steps to have the shippers of nondescript parcels placed on the same footing as themselves?

IS MELBOURNE THE PROPER PLACE TO MANUFACTURE VICTORIA'S BUTTER?

During the last two years, notwithstanding the findings of the Butter Board and the Royal Commission on the subject, the proportion of cream supplies coming to Melbourne for manufacture is on the increase. For the first four months of 1906 6,171½ tons net of butter reached Melbourne, against 2,201 tons net of cream, so that the latter amounts to 35½ per cent. in weight of the former, compared with 6,489 tons of butter for the same period in 1905, and 1,335 tons of cream, or 20½ per cent. Although the butter arrivals show an advance of 5 per cent. cream deliveries have increased by 65 per cent. On making a comparison of the last six months with the corresponding six months of the year before, and of the last twelve months with the corresponding twelve months, the increase appears gradual and to be making regular headway.

This movement has a close relationship to the question of grading and grade stamping of butter exports, and the recent action of some of those who

are so strenuously opposing the system. It has already been proved that country-made butter is better than that manufactured in the city, and it should be obvious to all producers which side to take.

VALUE OF INSPECTION.

It was found necessary during the season, not only to take further action regarding the quantity of moisture and boric acid contained in butter, but with regard to the matter of short weights also.

The percentage of moisture in Victorian butter is materially increasing, and, notwithstanding the action of the Department in previous years in reference to boric acid, stringent measures had again to be resorted to. For the first time the Department took a firm stand in connexion with short weights. Certain factories were written to in the height of the season, and recommended to improve their packing. After being cautioned a number of times, the Department finally stopped branding or shipping their butter. The principle being once established, "fish cannot be made of one and fowl of another," and, therefore, all butter short in weight is promptly stopped, and will not be branded by the Department for export.

Some idea may be gained of the delinquencies of butter factory managers when the fact is stated that consignments amounting to 133 tons were found to be short in weight, 28 tons excessive boric acid, and 5 tons with moisture beyond the maximum of 16 per cent.

PURE CULTURES.

During the season twelve butter factories used pure lactic acid cultures, which were prepared at the University laboratory and issued as required. It is noteworthy that in all the factories, with one exception, where there has been an improvement in quality, they were handling milk supplies exclusively; whilst with those in which the opposite occurred they were, with a single exception, dealing either partly or entirely with home separator cream. Grouping half-a-dozen of the latter factories and six of the former class, it is found that the average points in the cream supply class were 94.74 points for 1904-5, and 94.16 points for 1905-6, or a depreciation of .58 points. With the milk supply factories using the ferments, the average gained for 1904-5 was 96.00 points, and for 1905-6 96.54 points, or an increase of .54 points. Since in five cases out of six of the milk-supplied factories a distinct improvement was effected, it may reasonably be concluded that, where managers have full control of their supplies, the use of pure cultures is undoubtedly advantageous.

INSTRUCTION.

Since this time last year special University classes were held, and a practical course provided at the Cobden butter factory. Many butter factory managers and dairy students availed themselves of these facilities, and in every case, I believe, the result was a material gain both to themselves and the companies with which they were concerned.

Similar opportunities are being afforded this year, and it is gratifying to find such a large number enrolled, notwithstanding the fact that fees have been charged.

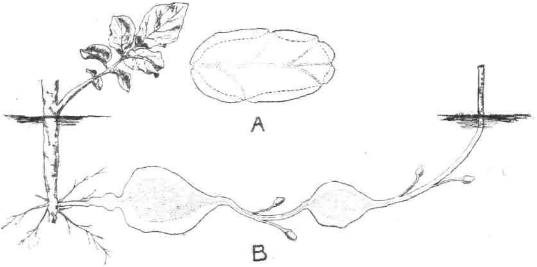
SELECTION OF SEED POTATOES.

George Seymour, Potato Expert.

There can be no doubt that the want of care in the selection of seed has in the past had a great deal to do with the inferior quality of many of the potatoes placed on the market, and also with the unremunerative returns to the farmer. The trouble has come about from want of knowledge on the part of many growers, as well as want of care, as they fail to discriminate between the wild potato and the true one.

DESCRIPTION OF THE WILD POTATO.

Every writer on the potato describes the tuber as a thickened underground branch. Balfour, in his *Manual of Botany*, describes the tuber

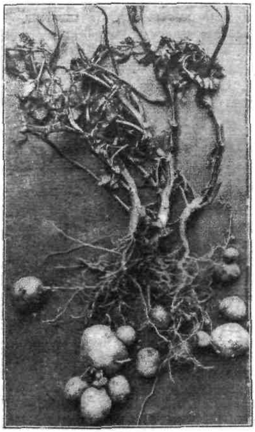


INTERNAL STRUCTURE OF POTATO.

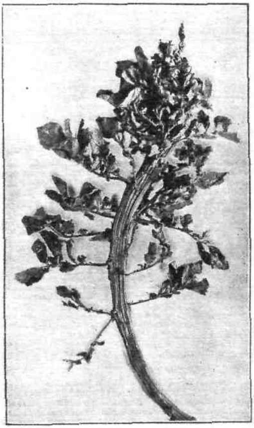
A. Cultivated Potato. B. Wild Potato.

as a thickened stem or branch, produced by the approximation of the nodes and the swelling of the internodes. This is strictly correct of the potato in its wild state, but only partly so of the plant when highly cultivated. If the wild potato be cut through the centre into two halves, from the crown to the stem end, the internal structure will be found quite different from that of the true potato. The core or centre of the wild tuber preserves a branch-like appearance right through, throws out a branch at the crown end, and forms another tuber, and so on till the last one may be two feet away from the parent plant, or the last stem may force its way up through the ground and produce a plant as shown in the illustration—(Fig. B). It is not so with a true potato, which, if cut through the centre, will show that the corticle layer surrounds the whole tuber (Fig. A), and is only pierced by a core line where the buds or eyes are found, and that all these lines proceed from the centre core, and are the channels along which the starch travels when a tuber throws out its shoots or buds. This outside layer is very poor in starch, and when these core lines do not pierce that layer it gives rise to what is known as cottony-eyed or blind seed, so often met with in Gippsland potatoes.

The wild plant in the accompanying illustration shows a number of stringy tubers, mentioned before, and also one fairly large one, with several small ones attached to it by short stems; these are not prongs, but separate tubers. In raising new varieties from seed, no effort is spared to get rid of all plants which show the slightest tendency to produce strings. In some cases not more than one plant out of a hundred is found to produce true potatoes, and even the produce of some of the tubers from this plant may in the following season be found to produce a wild strain. Consequently, it takes a long time before the type of a new variety is fixed, and it is ready to put on the market. There can be no doubt that many of the new varieties during the late potato boom were placed on the



THE WILD POTATO.



FLAT TOP OF "TASMANIAN RED" POTATO.

market before the type was fixed. The question is often asked: Why do potatoes run out? The same question may be asked in regard to the horse, sheep, or any animal the type of which is kept up to the standard by careful selection and breeding. The same answer applies to the potato.

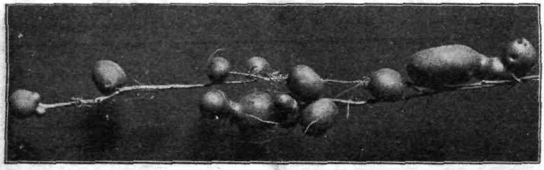
SELECTION OF SEED.

In the September *Journal* reference was made to the bloom of the plant as a means of distinguishing the true from the wild potato. In this article an effort will be made to give such a description of the bloom, aided by illustrations, and the foregoing description of the characteristics of the wild plant and tuber, that will, it is hoped, enable any one exercising

ordinary observation to know the wild potato. The careful study of the bloom has another and very important use, viz., it assists in the identification of variety.

THE BLOOM.

Potato plants may be divided into two sections—those that have white and those that have coloured flowers. The latter are purple, varying from a dark to a very pale shade, and some a tinge of pink. These shades are represented generally by the following varieties:—Dark purple, Coronation; medium purple, Up-to-date, Daniel's Sensation, and others; pale purple, Brown's River, Flat-top, Scotch Grey. It must be remembered that the shade of all these vary slightly in different soils, and also in the age of the bloom. In a few days it loses its colour, and by the time it falls has faded to a dirty white, and at this stage is very liable to be mistaken for the flower of the wild plant. It should also be remembered that many of the white-skinned potatoes have a purple flower, others have a white, such as the Beauty of Hebron, Carman No. 1, British Queen, Sir John Llewellyn, Ashleaf, and Lapstone. Kidney, The Rose, and Vermont also have a white bloom.



STRINGY GROWTH OF WILD POTATO.

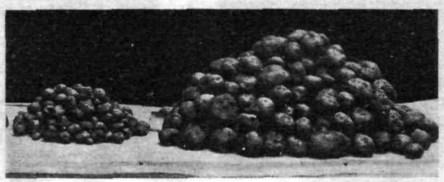
To know a wild potato by the flower, it is first of all necessary that one should know the flower of the variety. As a guide, it may be stated that when a plant which should have a coloured flower produces a white one, it is a sure sign that the plant is running out, and, although it may produce a very fair sample of potatoes, it will not long continue to do so. The difficulty arises when we consider the varieties which have a white flower. The wild one here shows a very slight difference, and can only be identified after long experience. The variety known as Flat-top has another strain, which requires to be culled out, viz., the plants which produce a very broad, flat stalk, varying from one to three inches. These produce one or two large, unshapely tubers for a season or two; but, if planted continuously, will yield a poor return, and should be got rid of as quickly as possible. The first evidence of degeneration is manifested in the plant by the flower cluster forming at the top of the haulm, in the form of a green knob or tassel, but no blooms ever appear. The tubers themselves can be detected, when selecting seed, by examining the crown, as the eyes run across it in the form of a crease, and when throwing out the crown shoot it is quite flat. Some growers have made it a practice to select these, thinking the flat haulm a characteristic of the variety, but this is a mistake. An illustration of this undesirable strain appears on the preceding page.

R.S. Brain, Govt Printer

1. Brown's River true bloom. 2. Brown's River wild bloom.
3. Uptodate 4. Coronation.

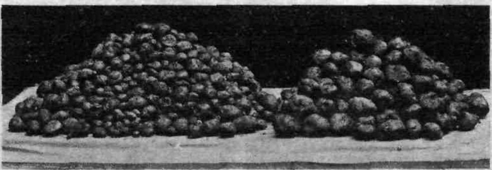
POTATO BLOSSOMS.

The weeding out of the wild blooms is only practicable when the standard of the crop is high, and the percentage of wild plants small; but it very often happens that more than one-fourth of the plants are wild. In some cases it has been found that more than 60 per cent. were below the standard. Many of these would produce tubers fit for market, and in a favorable season, on good land, would produce a very fair crop; but, nevertheless, it is essential that they should be got rid of. The best



PRODUCE OF 67 PLANTS, TRUE "TASMANIAN RED"—97½ LBS., 11 LBS WASTE.

plan would be to leave them till the digging time, and then select seed only from the best stools. The crop raised from this seed should be carefully watched during the next blooming season, and all wild plants pulled up. One point must be borne in mind: It is not enough to go through them once or twice, as all the plants do not bloom at the same time. After a fall of rain is a very favorable time. There must be no delay, as the coloured bloom soon fades; it has a dirty-white appearance, and may be mistaken for a wild plant. If the standard of the crop is to be maintained, the work must be attended to every year; but there is the satisfaction of knowing that the more thoroughly the work is done the lighter will



PRODUCE OF 131 PLANTS, WILD "TASMANIAN RED"—
106 LBS., 60½ LBS. WASTE.

be the task next year, until, from being a considerable undertaking, it will become a pleasure to go through the crop and pull out the unprofitable plants. The questions naturally arise: Will it pay to spend so much time over the crop? and Will the average grower take the trouble? To the former the answer must be "Yes," and to the latter most likely "No."

The accompanying illustrations prove that it will pay. They represent one drill, planted with 198 sets Tasmanian Red. The first is the actual return from 67 plants, which produced 97½ lbs. of potatoes, of which

11 lbs. were waste; and the other is the produce of 131 plants (wild), which gave a gross return of 106 lbs., with 60½ lbs. waste. Of the 198 sets planted, only 35 per cent. proved to be true potatoes, 65 per cent. being wild. About half the latter were of the flat-stalk strain mentioned above, and produced nearly all the large potatoes. In the second photograph, the white-bloom wild plant was responsible for nearly all the small ones. A glance at the illustrations should be sufficient to convince the most sceptical that there is a great deal more in the selection of seed than a mere fad. The figures are more striking. Had the whole drill been planted with good seed, it would have returned a fraction over 249 lbs. of marketable and seed potatoes, or a crop equal to 5 tons 1 cwt. 0 qrs. 24 lbs. As it was, the actual return was 130 lbs. of marketable tubers, many of which were only of medium quality, or 2 tons 12 cwt. 0 qrs. 26 lbs., a loss of 2 tons 8 cwt. 3 qrs. 26 lbs., which, at £5 10s. per ton, the market price at the time of digging, represents a money loss of £13 11s. per acre. These are actual facts. There is no guess-work about it, as the tests were carried out when the crop was dug, and weighed in the field. The variety mentioned, Tasmanian Red, is also known as Flat Top.

These facts should go a long way to stirring farmers up to the necessity of more careful attention to the selection of seed. The average grower may not take the trouble with his seed, preferring to market his crop and buy seed for next season. The result will be that the growers will naturally divide themselves into two groups. The few in the cooler districts of the State will become the raisers of superior strains of seed potatoes, which can be relied upon, and the many, comprised in all the districts, who will grow for local consumption and the export trade. In this way the standard of our potato crop will be greatly improved, and the industry become more profitable.

INOCULATION.

Much has been said about raising new varieties by inoculation, crossing one variety of potato with another. This is done with a view to improve either the yielding or cooking quality of the potato by crossing a gross-yielding potato of lower cooking quality with a light-yielding variety of good cooking quality and flavour. The good cooking varieties are, as a rule, light-yielding. In this case, some quality has to be sacrificed to obtain a heavy cropping variety. This method of obtaining a new variety entails an immense amount of work and careful observation. In order to carry out the work successfully, the plant that is to bear the berries must be carefully watched, and as soon as the flower opens have the anthers removed, to prevent self-fertilization. Then the other variety which is to be used for crossing must bloom at a suitable time, and have the pollen ready for fertilization, otherwise the operation will be a failure. There can be no doubt that many of the varieties to which new names are given are simply sports of well-known sorts. For example, the late or long Top Rose springs from the Early Rose. There is also a late strain in the Carman and the Hebron, and in many other varieties. They can always be distinguished by their robust stalks and habit of ripening late. The tubers are generally larger and of coarser appearance, though often of very good quality.

SUPPLEMENTARY LIST OF ARTIFICIAL MANURES forwarded from time to time to the Chemist for Agriculture for Analysis, as required by Section 4 (Sub-sections 1 and 2) of the *Artificial Manures Act Amendment Act* 1905.

SUPPLEMENTARY UNIT VALUES LIST, SEASON 1906.

Description of Manure.	Moisture.	Nitrogen.		Phosphoric Acid.								Estimated Total Value of Manure per ton.	Price asked for Manure per ton Delivered at Local Railway Station.	Where Obtainable.
				Water Soluble.		Citrate Soluble.		Insoluble.		Total.				
	Per-cent-age.	Per-cent-age.	Estimated Value in One ton of the Manure.	Per-cent-age.	Estimated Value in One ton of the Manure.	Per-cent-age.	Estimated Value in One ton of the Manure.	Per-cent-age.	Estimated Value in One ton of the Manure.	Per-cent-age.	Estimated Value in One ton of the Manure.			
			£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	£ s. d.	£ s. d.	
Blood Manure	13.84	8.65	4 15 1	..	..	..	..	..	..	..	..	4 15 1	4 10 0	Mt. Lyell M. and R. Coy., Melbourne
Sulphate of Ammonia ..	..	20.70	14 16 8	..	..	..	..	..	..	..	..	14 16 8	14 10 0	Metropolitan Gas Coy., Melbourne
" " ..	..	20.79	14 17 11	..	..	..	..	..	..	..	..	14 17 11	14 10 0	The Sheaf Brand Artificial Manure Coy., Melbourne
Nitrate of Soda	..	16.21	12 11 3	..	..	..	..	..	..	..	..	12 11 3	12 0 0	" " " "
Superphosphate, No. 1, Anchor Brand	10.60	..	..	17.80	4 0 1	1.80	0 7 2	..	..	19.60	4 7 3	4 7 3	4 5 0	Colonial Manures Coy., Melbourne
" No. 2, Anchor Brand	14.00	..	..	13.09	2 18 10	1.98	0 7 11	..	..	15.07	3 6 9	3 6 9	3 15 0	" " " "
" Concentrated	10.19	..	..	40.91	9 4 1	4.81	0 19 2	..	..	45.12	10 3 3	10 3 3	12 10 0	
" Ovens Improved	14.36	..	..	16.51	3 14 3	1.85	0 7 4	..	..	18.36	4 1 7	4 1 7	4 5 0	Strachan, Murray, and Shannon, Melbourne
" Extra dry ..	3.17	..	..	21.03	4 14 7	.97	0 3 10	..	..	22.00	4 18 5	4 18 5	4 7 6	A. H. Hasell, Queen-street, Melbourne
" Hasell's "Jap"	6.45	..	..	18.88	4 4 11	1.65	0 6 7	..	..	20.53	4 11 6	4 11 6	4 5 0	" " " "
" Concentrated	12.33	..	..	38.18	8 11 9	5.98	1 3 11	..	..	44.16	9 15 8	9 15 8	12 10 0	The Sheaf Brand Artificial Manures Coy., Melbourne
" Special ..	4.21	..	..	21.65	4 17 5	.97	0 3 10	..	..	22.62	5 1 3	5 1 3	4 10 0	" " " "
" Ordinary ..	10.66	..	..	14.32	3 4 5	3.07	0 12 3	..	..	17.39	3 16 8	3 16 8	4 5 0	" " " "
" Concentrated	10.43	..	..	41.35	9 6 0	3.40	0 13 7	..	..	44.75	9 19 7	9 19 7	12 10 0	Renard Fertilizer Coy. Prop. Ltd., Melbourne
Star Phosphate	..	..	..	..	..	14.90	2 19 7	5.83	0 17 5	20.73	3 17 0	3 17 0	4 0 0	Colonial Manures Coy., Melbourne
Nitro Superphosphate, Anchor Brand	9.80	1.14	0 10 10	8.63	1 18 9	3.15	0 12 7	5.50	0 16 6	17.28	3 7 10	3 18 8	5 0 0	" " " "
Bonedust and Superphosphate No. 1.	92	1.30	0 12 4	14.00	3 3 0	4.02	0 16 0	4.64	0 13 11	22.66	4 12 11	5 5 3	5 0 0	Mt. Lyell M. and R. Coy., Melbourne
Bone Superphosphate ..	8.34	3.24	1 10 9	4.62	1 0 9	5.62	1 2 7	9.97	1 9 10	20.21	3 13 2	5 3 11	6 0 0	Wischer and Co., Melbourne

SUPPLEMENTARY UNIT VALUES LIST, SEASON 1906—*continued.*

Description of Manure.	Moisture.	Nitrogen.		Phosphoric Acid.		Mechanical Condition.						Estimated total Value of Manure per ton.	Price asked for Manure per ton Delivered at Local Railway Station.	Where Obtainable.
								Nitrogen.		Phosphoric Acid.				
	Percentage.	Percentage.	Estimated Value in One ton of the Manure.	Percentage.	Estimated Value in One ton of the Manure.	Percentage of Fine Bone.	Percentage of Coarse Bone.	Percentage in Fine Bone.	Percentage in Coarse Bone.	Percentage in Fine Bone.	Percentage in Coarse Bone.			
			£ s. d.		£ s. d.							£ s. d.	£ s. d.	
Bonedust (Anchor Brand) ..	4.99	4.23	2 2 9	19.54	3 10 0	52.02	47.98	1.78	2.45	11.49	8.05	5 12 9	6 0 0	Colonial Manures Coy., Melbourne
"	4.80	2.27	1 2 3	5.95	0 18 6	83.59	16.41	0.51	1.76	0.79	5.16	2 0 9	4 0 0	John Adams, Doreen
" (Plough Brand) ..	6.02	4.19	2 2 3	23.12	3 18 8	41.02	58.98	1.67	2.52	9.43	13.69	6 0 11	5 10 0	E. T. Hoskin, Bairnsdale

SUPPLEMENTARY LIST SHOWING RESULTS OF ANALYSES OF SAMPLES OF ARTIFICIAL MANURES COLLECTED THROUGHOUT THE STATE, UNDER THE PROVISIONS OF THE ARTIFICIAL MANURES ACT 1905.

Description of Manure.	Manufacturer or Importer.	Moisture.	Nitrogen.		Phosphoric Acid.								Estimated Value per ton.
					Water Soluble.		Citrate Soluble.		Insoluble.		Total.		
		Found.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	
		%	%	%	%	%	%	%	%	%	%	%	£ s. d.
Thomas Phosphate	Cuming, Smith, and Coy., Melbourne	..	..	..	..	..	14.55	..	4.67	..	19.22	17.00	3 12 2
"	" " "	..	..	..	..	..	15.70	..	1.63	..	17.33	17.00	3 7 7
Superphosphate "	W. P. Shaw, Olderfleet, Melbourne	8.00	..	..	19.13	18.00	1.76	1.50	0.45	1.50	21.34	21.00	4 13 5
Superphosphate, No. 15 ..	Australian Explosives and Chemical Coy., Melb.	2.94	..	..	12.78	13.20	3.59	0.20	1.68	1.10	18.05	14.50	3 13 6
Superphosphate, Ordinary ..	" " "	3.78	..	..	18.70	18.00	3.49	1.50	0.58	1.50	22.77	21.00	4 18 6
Superphosphate	Colonial Manures Coy., Melbourne	8.50	..	..	17.53	17.50	2.78	1.00	0.65	..	20.96	18.50	4 10 6
"	" " "	11.00	..	..	17.13	17.50	1.80	1.00	..	..	18.93	18.50	4 4 3
Thomas Phosphate	" " "	..	..	..	..	..	15.22	14.00	6.34	3.00	21.56	17.00	3 19 10
" "	" " "	..	..	..	..	..	15.55	14.00	4.73	3.00	20.28	17.00	3 16 5
" "	" " "	..	..	..	..	..	14.91	14.00	3.57	3.00	18.48	17.00	3 10 3

SUPPLEMENTARY LIST SHOWING RESULTS OF ANALYSES OF SAMPLES OF ARTIFICIAL MANURES.—*continued.*

Description of Manure.	Manufacturer or Importer.	Moisture.	Nitrogen.		Phosphoric Acid.								Estimated value per ton.
					Water Soluble.		Citrate Soluble.		Insoluble.		Total.		
		Found.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	
		%	%	%	%	%	%	%	%	%	%	%	£ s. d.
Superphosphate, Standard Flag Brand	Renard Fertilizer Coy. Propy. Ld., Melbourne	9.65	..	..	17.56	17.00	2.93	1.50	0.76	0.50	21.25	19.00	4 11 5
” ” ” ”	” ” ”	10.74	..	..	17.22	17.00	1.81	1.50	..	0.50	19.03	19.00	4 4 9
” ” ” ”	” ” ”	..	..	..	17.41	17.00	3.11	1.50	0.65	0.50	21.17	19.00	4 11 5
” ” ” ”	” ” ”	9.26	..	..	16.42	17.00	2.84	1.50	0.51	0.50	19.77	19.00	4 5 8
Superphosphate, Standard B Flag Brand	” ” ”	9.13	..	..	11.36	12.75	2.36	1.30	0.74	0.24	14.46	14.29	3 1 3
Thomas Phosphate, Standard Flag Brand	” ” ”	..	..	..	..	..	14.11	13.17	4.59	4.00	18.70	17.17	3 10 2
” ” ” ”	” ” ”	..	..	..	..	..	14.27	13.17	4.33	4.00	18.60	17.17	3 10 0
Star Phosphate, Standard Flag Brand	” ” ”	..	..	..	..	..	14.48	..	3.25	..	17.73	17.00	3 7 8
Bonedust and Superphosphate, Standard Flag Brand	” ” ”	9.67	1.26	0.90	12.09	12.75	3.48	4.25	3.47	2.31	19.04	19.31	4 11 5
” ” ” ”	” ” ”	9.41	0.98	0.90	13.36	12.75	3.15	4.25	2.49	2.31	19.20	19.31	4 10 1
” ” ” ”	” ” ”	8.25	1.45	1.20	9.03	10.20	4.22	..	5.95	9.10	19.20	19.30	4 10 1
Superphosphate, No. 1 ..	Mount Lyell M. and R. Coy., Melbourne	10.62	..	..	19.78	18.50	3.12	1.25	..	1.20	22.95	20.75	5 1 5
” ” ..	” ” ”	9.12	..	..	19.62	18.50	1.45	1.25	0.77	1.00	21.84	20.75	4 14 9
” ” ..	” ” ”	9.47	..	..	19.50	18.50	1.32	1.25	1.27	1.00	22.09	20.75	4 14 3
Superphosphate, No. 2 ..	” ” ”	10.31	..	..	17.95	17.00	0.19	0.75	1.96	0.75	20.10	18.50	4 3 5
Superphosphate, Wischer's ..	Wischer and Coy., Melbourne	7.17	..	..	17.84	18.00	1.52	1.50	1.64	1.50	21.00	21.00	4 7 11
” ” ..	” ” ”	8.30	..	..	18.16	18.00	0.81	1.50	1.68	1.50	20.65	21.00	4 6 6
Superphosphate, Florida ..	Cuming, Smith, and Coy., Melbourne	9.73	..	..	19.09	18.00	2.04	1.50	0.80	1.50	21.93	21.00	4 14 9
” ” ..	” ” ”	8.95	..	..	18.44	18.00	1.00	1.50	1.48	1.50	20.92	21.00	4 8 4
” ” ..	” ” ”	10.46	..	..	18.92	18.00	1.37	1.50	1.20	1.50	21.49	21.00	4 11 8
” ” ..	” ” ”	10.60	..	..	18.06	18.00	1.20	1.50	1.27	1.50	20.53	21.00	4 7 3
” ” ..	” ” ”	10.10	..	..	19.17	18.00	0.65	1.50	0.86	1.50	20.68	21.00	4 9 8
Bonedust and Superphosphate ..	” ” ”	7.46	1.77	1.50	9.19	7.50	6.22	5.00	7.55	8.00	22.96	21.00	5 6 10
Superphosphate, Nitro ..	” ” ”	14.36	0.96	1.00	10.65	10.01	3.35	3.88	5.76	5.48	19.76	19.37	4 8 5

SUPPLEMENTARY LIST SHOWING RESULTS OF ANALYSES OF SAMPLES OF ARTIFICIAL MANURES—*continued.*

Description of Manure.	Manufacturer or Importer.	Moisture.	Nitrogen.		Phosphoric Acid.								Potash.		Estimated Value per ton.
					Water Soluble.		Citrate Soluble.		Insoluble.		Total.				
		Found.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	
		%	%	%	%	%	%	%	%	%	%	%	%	%	£ s. d.
Superphosphate No. 1 ..	Mt. Lyell M. and R. Coy., Melbourne	10.48	..	..	20.02	18.50	1.38	1.25	0.74	1.00	22.14	20.75	..	..	4 16 0
" " ..	" " "	11.04	..	..	19.75	18.50	1.65	1.25	..	1.00	21.40	20.75	..	..	4 15 5
" " ..	" " "	11.15	..	..	20.15	18.50	2.30	1.25	0.76	1.00	23.21	20.75	..	..	5 0 6
" " ..	" " "	8.72	..	..	20.30	18.50	2.91	1.25	..	1.00	23.21	20.75	..	..	5 2 11
Superphosphate, Nitro ..	" " "	9.62	1.68	1.60	17.06	16.00	1.15	1.00	1.06	0.75	19.27	17.75	..	..	5 1 8
Superphosphate, No. 1 ..	" " "	11.30	..	..	18.96	18.50	1.80	1.25	1.40	1.00	22.24	20.75	..	..	5 1 5
Potato Manure	" " "	7.79	1.00	1.00	14.88	15.50	3.78	0.50	0.82	1.00	19.48	17.00	4.20	4.00	5 17 9
Superphosphate, Standard Flag Brand	Renard Fertilizer Coy., Melbourne	9.03	..	..	16.64	17.00	2.72	1.50	0.76	0.50	20.12	19.00	..	..	4 6 5
" " "	" " "	6.15	..	..	16.64	17.00	3.89	1.50	..	0.50	20.53	19.00	..	..	4 10 4
Superphosphate, Standard B. Flag Brand	" " "	7.46	..	..	12.57	13.75	2.82	0.25	0.18	..	15.57	14.00	..	..	3 7 11
Superphosphate, Standard Flag Brand	" " "	9.95	..	..	16.29	17.00	3.83	1.50	..	0.50	20.12	19.00	..	..	4 8 6
" " "	" " "	9.85	..	..	16.33	17.00	3.73	1.50	..	0.50	20.06	19.00	..	..	4 8 4
Superphosphate, "Florida" ..	Cuming, Smith, and Coy., Melbourne	10.86	..	..	19.87	18.00	0.55	1.50	0.21	1.50	20.63	21.00	..	..	4 11 9
" " ..	" " "	8.54	..	..	19.91	18.00	0.61	1.50	0.48	1.50	21.00	21.00	..	..	4 12 5
" " ..	" " "	9.90	..	..	19.71	18.00	0.42	1.50	0.70	1.50	20.83	21.00	..	..	4 16 8
" " ..	" " "	9.96	..	..	19.57	18.00	1.02	1.50	0.24	1.50	20.83	21.00	..	..	4 12 2
" " ..	" " "	11.99	..	..	18.25	18.00	2.75	1.50	..	1.50	21.00	21.00	..	..	4 13 3
" " ..	" " "	11.58	..	..	19.08	18.00	1.06	1.50	1.12	1.50	21.26	21.00	..	..	4 11 1
Superphosphate and Bonedust	" " "	7.02	1.40	1.50	9.57	7.50	5.57	5.00	5.98	8.50	21.12	21.00	..	..	4 17 6
Superphosphate, Nitro ..	" " "	9.51	1.05	1.00	11.04	10.01	4.72	3.88	5.76	5.48	21.52	19.37	..	..	4 16 7
" " ..	" " "	7.36	0.93	1.00	9.88	10.01	4.21	3.88	6.94	5.48	21.03	19.37	..	..	4 11 7
Potato Manure	" " "	6.90	1.00	1.00	15.70	8.21	2.18	3.63	1.83	5.53	19.71	17.37	5.22	5.20	6 3 4
Superphosphate, Wischer's ..	Wischer and Co., Melbourne	6.46	..	..	17.76	18.00	1.60	1.50	2.91	1.50	22.27	21.00	..	..	4 9 6
" " ..	" " "	6.35	..	..	18.39	18.00	1.71	1.50	2.17	1.50	22.27	21.00	..	..	4 11 9
Superphosphate, Federal O. S	Australian Explosives and Chemical Coy., Melbourne	8.77	..	..	19.18	18.00	1.36	1.50	1.60	1.50	21.14	21.00	..	..	4 13 3
" " "	" " "	7.51	..	..	18.04	18.00	2.62	1.50	0.90	1.50	21.56	21.00	..	..	4 12 5
Market Garden Manure, No. 2	" " "	5.87	2.01	1.50	12.32	10.70	2.35	0.20	0.80	1.10	15.47	12.00	3.75	3.50	5 18 4
Superphosphate, Soluble (Jap.)	A. H. Hasell, Melbourne	11.23	..	..	18.26	18.50	1.45	1.50	..	..	19.70	20.00	..	..	4 7 11
" " "	" " "	10.30	..	..	17.73	18.50	2.52	0.07	..	..	20.32	20.00	..	..	4 9 9
Grass Manure, Anchor Brand	Colonial Manures Coy., Melbourne	3.75	..	..	..	..	10.57	12.60	7.36	2.70	17.92	15.30	1.30	1.25	3 11 4

W. PERCY WILKINSON, Government Analyst and Acting Chemist for Agriculture.

SELECTING AND PLANTING FRUIT TREES.

C. Bogue Luffmann, Principal, Burnley School of Horticulture and Small Farming.

GROW BUT FEW SORTS.

As the quantity of commercial fruit increases the number of species and varieties employed decreases from year to year. This is as it should be, since it would prove impossible to build up a permanent local and oversea trade by means of a great variety of fruit in small parcels. Fruit-growing has been engaged in long enough to indicate what is most suitable and profitable in different soils and situations, and it remains to increase the output of such lines as have, on the whole, given profitable returns.

In rare circumstances, several species and varieties of fruit may be grown, but the best commercial result will always come from adhering to two or three well-chosen sorts.

The leading half-dozen deciduous fruits are apples, pears, plums, cherries, peaches, and apricots. Any one starting a new orchard, or replenishing an old, should rely chiefly on these trees, as their produce is wanted in many markets.

SELECT ACCORDING TO SOIL AND SITUATION.

The first four do best in cool country, whereas the peach and apricot like plenty of heat and a warm and sweet winter soil.

In selecting trees, we should be able to estimate their especial wants, as it is only where their tastes are in keeping with the soil and climate that they thrive and prove profitable over a full life.

Amongst trees of any one species will be found varieties of varying strength of wood and capacity to resist disease, and no choice should be made without learning which are, under all the circumstances, best for a particular soil and situation. By way of example, trees of weakly constitution should never be placed in stiff, dry, and poor soil. Such a soil must be placed under the most robust and hardy kind of tree, if it is to hold its own and yield a profit.

It rarely happens that a piece of ground presents a uniform soil and opportunities throughout. Difference in depth, level, aspect, drainage, and protection from sun and wind, bring about very marked differences in its tree-sustaining powers, and as the resources of the orchard area vary, so should the species or varieties of tree.

DISTANCE TO PLANT.

In exposed positions protection is an advantage, whilst in confined positions, or shady hill-sides, exposure is an advantage. Thus, trees may require to be planted close together or far apart, according to the amount of protection or degree of exposure they are likely to need. It has been the custom to plant far apart where the soil is at all poor, but this is fundamentally wrong, as the more the soil is exposed the more it will be desiccated and wasted. Fairly close planting is therefore most appropriate where soil is thin, poor, and liable to summer droughts.

Trees should not be planted at varying distances excepting where distinct breaks—as ditches, fences, or double headlands—occur in the orchard or where there exists a marked difference in the quality of the soil and the kinds of trees chosen. For instance, upright or small-growing trees do not call for so much room as those which grow to large size and spread a good deal. Such apples as "Jonathan," "Five Crown," and "Rokewood" often pay well as semi-dwarfs, standing at no more than 7 or 8 feet in height, and of about the same diameter. Sixteen, 18, or 20 feet, at most, is ample for such trees. Of course, if the soil is really good, larger trees should be encouraged, and then wider planting is necessary.

LENGTH OF TRUNK VERY IMPORTANT.

For all exposed and warm positions, choose short-trunked trees. The shorter the trunk, the more vigorous the resulting branches, and the greater the tree's power of effecting a fair start. The distance between the leaf system and the root system governs the movement and value of the sap. Long-legged trees yield small, weak branches, become stunted, fruit early, and soon decline; whilst short-trunked trees grow vigorously, screen all their wood from the burning summer sun, make even and robust branches, assume a good size, yield the largest possible amount of fruit, and last out a full life.

Long trunks are appropriate only where the position is shaded, the soil rich, cool and moist at all seasons, as here a restricted sap-flow would prove an advantage.

TIME TO PLANT.

Early winter is the best time at which to plant deciduous fruit trees. As soon as the leaves become discoloured, the sap in the roots begins to move more or less actively, and if the soil is kept sweet and warm a free extension of root-growth will take place. The nature and extent of the autumn root-growth governs the behaviour and value of the head-growth in the following year.

When the proper season for planting is selected, the roots commence to grow at once, and no waste or loss of vitality occurs in any part; but if a tree is placed in cold winter soil, and remains stagnant for many months, it not only makes no advance, but actually loses by the rooting of some of its fine roots, and also by means of the drying out of the moisture from the head, which always goes forward at a great pace when the roots are not active.

NATURE OF ROOT GROWTH.

Different species of fruits have varying powers of root-growth, according to the size and vigour of their root systems and the temperature of the soil in which they are placed. Thus, plums, apples, pears, and cherries can root in a much colder season and soil than can peaches and apricots. The former group may, therefore, often be planted in the depth of winter without incurring any injury; whereas the peach and apricot, if forced to endure a cold and wet soil, and with no means to grow at the root, usually die, or become no more than feeble and unprofitable trees.

The number, size, arrangement, and degree of freshness of a young tree's roots at the time of planting go far to determine the value of its

after-life. Fibrous roots are too often sought after. These, being soft and weak, quickly die out, if not confined in a moist packing, and kept away from air. Further, fibrous root systems indicate growth in a light rich soil, and where trees have to face a comparatively poor, stiff, and dry soil, a few stout and well-preserved roots are more capable of getting a grip of the situation than are a number of fibrous ones. These, failing to force their way, stagnate and die; meanwhile, the whole body of the tree languishes, and often fails outright where no strong roots are promoted to replace the feeble and short-lived fibrils.

As before stated, the native vigour of different kinds of trees varies greatly. Thus, a healthy young plum tree, placed in congenial earth, will make substantial roots within a week; whereas a pear, placed alongside, may make no sign in a month. This does not imply that the pear is a feeble-rooting tree; on the other hand, it makes the largest and heaviest root system of all our orchard trees, but it is slow to start when compared with the plum. Knowing how prompt or tardy a tree may be to seize on the soil and secure itself, enables one to decide with certainty on the best time and method of planting.

How to Plant according to Season and Soil.

For instance, autumn planting should always be very shallow. The roots should be so near to the surface as to feel the benefit of the warm sun. They will then root promptly, and continue to grow as long as the soil remains warm, moist, and sweet. On the other hand, if planted deeply, covered with a cold or wet mulch, or beneath a flat or airless soil, they will have no power of growing, or even preserving their vitality, till the spring season. In a word, one may say: Plant on the surface to face a cold season (winter), and plant a little deeper to face a hot and drying season (summer).

Autumn planting is best for those trees which can endure the most extreme cold, but those which dislike cold are most successfully planted in spring; of course, much depends on soil and situation. A peach or apricot should be set out in Mildura at the end of May or early in June, whilst the same tree would stand a better chance in Gippsland, or any other cool district, if planted in August or September.

Autumn planting is the best average season for all trees in the North and Central districts of Victoria, but autumn, winter, and spring may prove best for different subjects in the cool South and in the high-hill country. Trees should never be set out in either dry or wet soil. It should be moist, friable, and what gardeners call "kind"—that is, mellow, charged with humus, clean, and sweet. Roots can soon take hold of such material, and grow robust enough to endure the cold of winter. Where possible, water should be used at planting. This does not chill the soil for more than a very short period, whilst it serves to drive out any excess of air, and thereby create the proper rooting medium.

Protect and Prepare Roots before Planting.

When water is not available, the roots of trees should be soaked in a dam or other receptacle for 12 or 24 hours. This is especially necessary where they have been a long time out of the ground, and have been allowed

to get quite dry on their exteriors. If the bark of either root or head is in any way shrivelled, immerse the whole of the tree in water. Sometimes three or four days' immersion helps more than the soaking for a single day, but this must be decided by experience and the power of judging what each tree wants. As a precaution against getting trees in a dried-out condition, state when ordering that they must be thoroughly well packed; also make sure that they are consigned direct, and on your part take prompt delivery, and in all cases drench with water as soon as possible.

THE NURSERY BED.

A well-lighted and mellow strip of soil should be in readiness to receive the trees on arrival, and after the heads and roots have been trimmed of any damaged and straggling wood, they should be planted upright in this nursery bed, then watered, and afterwards have the soil trodden sufficiently firm to make the roots start into even growth. If laid on one side, which is a common practice, the roots grow unevenly, and this leads to a faulty shape in the head of the future tree.

On lifting to plant out, have two or three wet bags or large pieces of canvas, also the most careful hand to lift and transport to where the trees are to be planted. Keep the drying air from the roots as much as possible; plant to a stake driven near the centre of the hole. The soil in the bottom of the hole should be highest in the centre, so that when the tree is placed thereon, its roots slope downwards. Place the first soil over the root points, and tread it firm; then fill up to near the ordinary level, and give a bucket of water; failing this, give a little more soil. In a week or so the trees should be all examined in turn, the soil readjusted, the stakes and ties seen to, and a small gutter cut where there is any danger of water lying about the young tree during winter.

As to weeds, they may either injure or aid the young tree—all depending on its wants in the way of protection or exposure. Where weeds make soil excessively wet and cold, and the tree's roots dislike these, then a clean and weedless surface should be preserved; but in the case of pears, plums, apples, and cherries they are often aided more by a weed-covered soil than by one which grows dry, hard, and bare from exposure to strong winds.

GARDEN NOTES.

J. Cronin, Inspector, Vegetation Diseases Act.

The Chrysanthemum.

The garden chrysanthemum is a descendant of C. Sinense, a Chinese species of hardy, perennial, herbaceous growth. It is recorded that it was first introduced into France in 1789, and the following year was flowered for the first time in England, at the Royal Gardens, Kew. The original importation was purple in colour, and was illustrated in the *Botanical Magazine* of 1796. New varieties were quickly produced from seed; in 1824, 27 distinct kinds were grown in the Horticultural Gardens at

Chiswick. In 1846, Robert Fortune, a plant collector, sent from China the Chusan daisy, the forerunner of the pompon type; and in 1861 sent from Japan plants of the varieties cultivated there.

The chrysanthemum had been cultivated for centuries in Japan, and, though a native of China, had become the national emblem. The types sent by Robert Fortune to England were of very different character to those raised there, being of irregular rugged form, larger and brighter in colour, and altogether weird in comparison with the formal incurved varieties grown in England. Since that time, varieties have occasionally been imported from Japan, among the most notable being "Edwin Molyneux," a grand crimson, and "Mrs. Alpheus Hardy," a white-plumed or hairy variety. For many years chrysanthemums have been raised from seed in vast numbers in England, France, America, and Australia, and better varieties have been distributed than exist in Japan.

Among the many types grown, the class known as Japanese is by far the most popular, on account of its superior size, varied form, and diversity of colour. In Victoria, it is the only class grown to any extent for exhibition, though numbers of the older types are still grown for garden decoration, and for market purposes as cut flowers. The Japanese type embraces a number of very early blooming kinds, largely grown in England for decorative purposes, few, if any, of which are cultivated here. It is possible to have chrysanthemums in bloom here from February, when the early varieties, "Madame Desgrange" and "Lady Fitzwigram," flower, until August, when "Mrs. H. Cannell" and other late flowering kinds can be grown to produce their blossoms. The types are—Japanese; Chinese, or incurved; anemone; pompon; single; and feathery, or thread-petalled, a recent type of small size, valuable for decorative purposes.

CULTIVATION FOR GARDEN DECORATION.

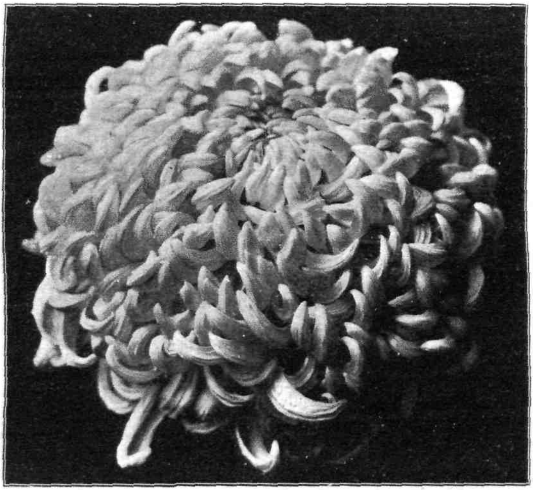
There is no plant that will endure such extremes of heat or cold, exposure or shade, as the chrysanthemum. There is none that responds so readily to good culture; a fair amount of root room, plant food, and light insuring a vigorous, free-flowering plant. A single plant, under *fair conditions, will produce fully 100 trusses of flowers. For general* purposes, the flowers may be thinned or otherwise, according to the taste of the cultivator. After the plants have finished flowering, the old stems die to the ground in most cases, and from beneath the surface produce a number of "sucker" shoots, each with a separate root system. To make large plants three of these suckers may be planted in a triangle about six or eight inches apart, or, if the soil is rich, one will suffice. The plants may be set out early in September, and allowed to grow steadily. When about a foot in height, they should be cut back to within six inches of the ground, when they will break into side growths, which will form dwarf, sturdy plants. They should be supported, and the tops again removed when about eighteen inches high, after which they should be allowed to grow uninterruptedly. Unless the blooms are to be thinned, no other treatment is needed, except the usual cultivation, watering, and supporting that is practised in any well-managed garden.

CULTIVATION FOR EXHIBITION.

Most of the chrysanthemums grown for exhibition by amateurs are cultivated in beds, or as such cultivation is usually described, in the open

ground. This is to distinguish such culture from that where the plants are exclusively grown in pots. In pot culture it is an important point to propagate the young plants from cuttings, from which the "eyes" that are below the surface are often removed. In the open ground it is not of much importance, as the suckers that often occur are easily removed without damage to the roots of the plant.

In pot culture it is necessary to "feed" the plants with liquid manures early in the season, the plant food in the small quantity of soil being soon exhausted. In a well-prepared bed such feeding is altogether unnecessary until a much later stage is reached. Most of the fine exhibition



JAPANESE VARIETY, "LADY NORTHCOTE," WHITE INCURVED TYPE.

arieties can be grown to produce as good flowers in the open ground as n pots. It is necessary to provide a covering of canvas or calico when he flowers are opening, to protect them from dews, sun, rain, and wind, he latter especially. Narrow beds that contain two rows of plants are nost easily managed. A bed 20 feet long and 6 feet wide will accommoate 24 plants; a light framework can be erected and covered with calico asily and cheaply. The writer's plants are grown in such beds, and are eated in the following manner:—Suckers are taken from the old plants fter the flowering season is over, and rowed out in rather poor soil ntil October. The beds are each season prepared in ground that was ccupied by other plants the previous year. A liberal dressing of half-

rotted stable manure and bonedust is deeply worked into the beds in the winter, and the beds are allowed to remain till the planting season in a rough, loose condition. The soil is light sandy loam, and the whole bed is again dug and firmly trodden. The plants are rowed out 18 inches from the edge of the beds in each direction, 3 feet being allowed between each row, 18 inches between each plant. The beds face east and west, so that the plants, when covered in autumn, are protected from the north and south winds.

JAPANESE VARIETY, "F. S. VALLIS," YELLOW, LONG DROOPING FLORETS.

At planting time any suckers or prominent "eyes" are removed from the young plants, and the after cultivation is hoeing the surface of the beds, tying the growing shoots (of which three are selected to form the plant after the first break into side growth) as growth advances, and removing all lateral and sucker growths that occur. In very hot, dry weather, a thorough watering is applied, but only when the plants need it. During February, a flower-bud usually forms in the point of each shoot. This is what is known as the "crown" bud, and produces the best bloom. All growths around it are carefully removed, and the flower-bud allowed to develop.

The buds are liable to be attacked by caterpillars of various moths at this stage, so a careful and frequent examination is necessary. When the buds are about the size of a filbert, liquid manure made from horse-droppings and soot is applied, as also occasionally liquid guano manure. If any variety is extra vigorous, with large glossy foliage, it receives no liquid stimulant. When the flowers begin to expand, they are protected by unbleached calico blinds, so arranged that they can be rolled up if necessary. Fine blooms are usually produced.

A list of Japanese varieties of fairly easy culture and varying form is as follows:—"Lady Northcote," "Madame Carnot," "Miss Maud Jeffries," "Miss Nellie Pockett," "The Princess," "Mrs. F. F. Thompson," white; "F. S. Vallis," "Lady Talbot," "Duchess of Sutherland," "Charlie Cronin," "Cheltonii," "Mrs. William Knox," "Mrs. W. Mease," yellow; "Lady Hopetoun," "Mrs. F. S. Grimwade," "Beatrice May," "Miss Anetta Henley," "Miss A. Kellerman," pink; "Lord Hopetoun," "W. R. Church," "T. Carrington," "Rosy Morn," "J. H. Doyle," "E. J. Brooks," "Mrs. James Marshall," crimson, and purple shades.

Flower Garden.

Those who contemplate planting deciduous trees and shrubs, roses, &c., should lose no time in making the necessary preparation. With the fall of the leaf is the best time for planting, the subject then more nearly approaching a dormant condition than at any other period. In preparing land for the reception of trees or plants that may be expected to grow for many years where planted, provision should be made for a lasting supply of food and moisture. Working and enriching the soil to a depth of 2 feet will enable most plants, when established, to endure extremes of heat and drought, if ordinary cultivation of the surface is practised.

Good drainage is an absolute necessity. If it is not possible to lay drains that would effectually draw off all surplus moisture from the beds, it is far better to raise the surface of the beds than work deeply. No drain is of much use that is not placed in a clay or subsoil of a more retentive nature than the cultivated soil. Where undrained paths cross the natural fall for the water, the beds in wet weather are often mere dams. The water, finding the path barrier harder to penetrate than the worked soil, follows the line of least resistance, and often practically fills the whole area, souring the soil. Drains (below the level of the worked soil) should be laid at intervals through such paths. Planting should not be done when the soil is very wet, nor should hot, crude manures be brought into contact with the roots.

A number of new roses have been imported by various nurserymen, and plants of many varieties are available. Several of the novelties are very promising, but two kinds that were specially inquired for on account of the descriptions, coloured plates, and reports from England, have not yet flowered here. Those are "J. B. Clark," a gold-medal rose; H. T., described as a deep scarlet, shaded blackish crimson; and Charles J. Grahame, H. T., orange crimson. In growth, "J. B. Clark" approaches very closely to the Hybrid perpetual section. Good flowers were seen during autumn of "Betty," "Hon. Ida Bingham," "Mrs. John Bateman," "Jakobs Perle," "Graff Fritz Hochberg," and "Grand Duchess Alexandra," a beautiful white variety.

Sweet peas are becoming more popular each year, owing to the improved varieties that are being raised. They make fine border plants when properly grown and trained, and are very useful for decoration. The seed should be sown at intervals from June till August, to have them in flower until the hot weather comes. The most common cause of failure is sowing the seeds too thickly. Six or eight inches should be allowed between each plant.

Kitchen Garden.

Ground should be prepared for onions, peas, broad beans, and other vegetables that will be required in season. In soils deficient in lime, where it is proposed to grow peas and other leguminous crops, a good dressing of fresh lime is most beneficial. It should not be used with stable manure, as it drives off ammonia, one of the most valuable constituents of such manures.

Onions ready to transplant may be set out now. The practice of cutting off the tops and part of the roots of the young plants, when preparing them for transplanting, is general in the market gardens near Melbourne. The plants are easily handled, and suffer nothing by losing the first-made roots, which are always practically destroyed in the transplanting process. It is also claimed that it minimizes the risk of transferring root eel-worms to various parts of the garden, should the plants in the seed-beds be affected. Only the roots should be inserted when planting, a most common cause of onions failing to "bulb" being deep planting.

Seeds may be sown of peas, broad beans, onion, and cabbage, to insure a succession. Weeds should be removed from young growing crops; and corners that harbor snails, woodlice, &c., should be cleaned up and dressed, with hot lime or salt.

POULTRY FOR THE CLOSER SETTLEMENT SETTLER.

H. V. Hawkins, Poultry Expert and Lecturer.

With the advent of settlement of our young men in large numbers on the land, I am convinced that poultry will play an important part with the small farmer. The egg in the kitchen cannot be dispensed with; it is as salt is to the food we eat. In addition, greater facilities should be given the small farmer in securing reduced rates on our railways, and, with a united effort to co-operate, markets may yet be found which will bring about a revolution with hen products. Then, instead of the middleman reaping the profits, the settler will devote more time to the golden hen.

VALUE OF CO-OPERATION.

Suppose, for example, the Wyuna settlers make up their minds to breed poultry, which I have no doubt they intend doing, I would strongly urge them to meet together and discuss with the writer matters of such importance as co-operating in the purchase of material at wholsesale rates. By the combined efforts of many, wire mesh can be had at reduced prices, and instead of paying so much freight and cost of cartage on a few rolls, they could receive a truck at half the freight. In the selection and purchase

of stock co-operation can again be resorted to, with great saving to each individual, by securing the services of an authority on poultry, he being more competent to select sound, healthy stud birds. By ordering a large number they could be obtained at reduced rates. Then, again, foodstuffs that cannot be grown on the settlement could be bought in large quantities at wholesale rates. Thus, even in commencing to farm poultry, £5 per man at least could be saved, which is an item to each settler. In the same way could the carriage of timber, iron, wire, nails, &c., ruberoid, shelter trees, live stock, foods, incubators, and brooder houses be managed. They should appoint one of their number to act as the settlers' agent, he to be responsible for the whole, the proper distribution of goods, and the collection of all monies; and, further, he could receive each settler's eggs daily, or, say, twice weekly. The eggs should be graded according to size and colour, must be clean, and should be well packed, and sent direct in large parcels to either the cool stores (to wait the rise of market) or to the firm with whom the settlers may contract to supply eggs. Thus, instead of each individual settler sending his few eggs to Melbourne, this one agent would be the collecting centre and the one distributor. Think of the amount of time saved, and the additional profit which would accrue to each individual settler.

My advice to the Wyuna settlers, therefore, is, whenever they require goods or wish to dispose of produce, that they should combine together. Further, to earn a name for their hen products, they should make a big effort to keep a uniform type of fowl—make the settlement known for its quality of poultry. A good reputation is worth much. For example, instead of Jones breeding modern (leggy) game, which do not pay, and Smith breeding Langshans (also leggy), and Brown having breeds such as Cochins or Brahmas (which cost almost as much to feed as does a cow), follow the example of one who has made this question a lifelong study, and who knows what the consumers abroad require.

WHAT TO BREED FOR LOCAL AND HOME MARKETS.

Select an Indian Game Cockerel, with six Buff Orpington second-season hens. These make an excellent cross, can be obtained in any numbers, and are admirably adapted to the climatic conditions of Wyuna, being very hardy. This selection would simplify matters considerably. If all agreed to send nothing to market but this one grand cross—which, when hatched at the right time, would in five months average 6 lbs. weight, having fine big bodies, and, being low set, long keeled, and white legged, and with the flesh white and succulent—what a sight they would be! Being of uniform type and colour, and symmetrical in appearance, they would command top prices, either for local consumption or for export. The settlement would soon receive a great name for poultry, just as the firm of "Lea and Perrin" has for its renowned sauce.

Then, as to egg production, the settler naturally asks, "Will this cross produce abundance of eggs?" My answer is, "Only a fair number"; and I would recommend keeping a breed for eggs only. That breed should be the pure White Leghorn, which will thrive at Wyuna; they are great foragers, are the best breed to keep for egg production, and are always obtainable at a reasonable figure.

This, then, should suffice for all practical purposes, *i.e.*, eggs and flesh. "What to do and how to do it" will be my subject to the settlers at

Wyuna when opportunity offers. Whatever is the decision arrived at regarding this subject on which much will depend for early returns—co-operate, co-operate! Union is strength, and to this end let the settlers of Wyuna and other estates strive. Success is assured, as far as poultry products are concerned.

The Despatch of Poultry.

Of all farm animals, none are so shamefully treated by the farmer as are fowls and ducks in transit to the consignee. Visiting so many centres throughout the State, I am able to judge of their comfort or otherwise. Last month, when travelling from Warracknabeal, I observed a number of birds on the Murtoa station, packed like sardines, with scarcely breathing room. It is time breeders were compelled by law to provide proper accommodation for their stock while in transit. This is the class of so-called poultry farmer who retires from the business in fairly quick time, and it is as well.

Of what use is my lecturing and demonstrating to the farmer how to produce the fowl for home markets if these rules are disregarded? Have I not often repeated that fowls require a thoughtful and intelligent owner? Without thought and intelligence failure is certain. A regulation is necessary for the guidance of railway officials, giving them power to refuse to despatch any live stock unless in proper sized crates or boxes, and not more than a given number in each one. Is it any wonder that the agent deducts off the farmer's returns for loss of weight or for deaths? It frequently happens that fowls and ducks lose ½ lb. to 1 lb. weight by insufficient air, &c., during a journey of thirty hours. Does the consignor not realize that it takes two to make a deal? Be fair to the stock, and also honorable to the consignee. Last week, at Castlemaine, I saw six ducks crushed together in a gin-case.

SALE ROOMS—THE NEED OF INSPECTION.

Another point of great importance is the unsatisfactory condition of some auction rooms, where sales of poultry are conducted. I refer to the filthy pens, which are fixtures, and receive scant attention, in so far as that important essential to public health is concerned—cleanliness. It is highly desirable that officers should be empowered to deal with offenders in this regard, not only to compel observance of the rule of cleanliness in the sale rooms, but also on the farm.

Coops, instead of fixtures, should be used in the auction rooms. They should be moveable, and have floors made to draw out, to allow of disinfecting and thoroughly cleaning after each sale day. Almost every known disease has at one time or other been left in wooden pens by germs. It is a menace to the public health, and often creates a feeling of dislike and disgust for this usually much-enjoyed delicacy. We breeders desire to increase the consumption of the hens' products. Knowing full well that by lowering the quality of any food product we decrease the demand for that product, it is therefore to the breeders, agents, and consumers' interests that the birds should be kept under the most favorable conditions. The result will be better kept yards and more of them, a greater demand for the table bird, and larger profits to all concerned. These results can be achieved at a small cost—cleanliness—without which no po[illegible]

SOME ERRORS NOTICEABLE IN THE MANAGEMENT OF BUTTER FACTORIES.*

R. T. Archer, Dairy Supervisor.

This subject has been chosen particularly for the benefit of the younger and less experienced members of the Association, not that there is anything new to disclose, but there are some points in management wherein, from want of thought generally, apparently slight errors cause considerable trouble and worry, and I scarcely need say that enough of these fall to the lot of a butter factory manager without increasing them needlessly.

Everyone connected with the industry will admit that the average supplier is difficult to reason with, and to make understand the meaning of the two golden rules in connexion with the management of dairy produce, that is, the necessity for cleanliness and coolness in the handling of the raw product until it is delivered at the factory. It is an old proverb that "Example is better than precept," and if we want to make suppliers observe the strict cleanliness so necessary for the production of a first quality butter or cheese, we must set the example by keeping everything scrupulously clean and tidy at the factory, and the moral effect will be considerable. We have to gain the confidence of the suppliers, and this is no easy matter at times when our competitors are strenuously working in exactly an opposite direction, and this alone should make us additionally careful that all our operations should be correct and above suspicion. We may consider here what are the points most calculated to produce want of confidence in the supplier, and I think by far the most important is the return for the cream supplied. Some suppliers try numerous dodges which they consider clever to catch the manager napping. To combat these, we must be sure that we are working on correct lines, when we will have nothing to fear from any tricks played upon us. We must be absolutely sure that we are giving the supplier correct returns for the cream supplied, and this we can be if the sample is properly taken and tested.

In the majority of instances, cream delivered to the factory is too thick to admit of being thoroughly mixed by stirring. In such cases, the only way to get a correct sample is by means of a glass or metal tube, with an air-tight plunger working like a syringe. The rod of the plunger is held stationary at the level of the top of the cream, and the tube pushed steadily to the bottom of the can. A vacuum is created in the tube, which is filled by the cream. In this way a complete core of the contents of the can is taken from top to bottom, giving a correct sample; be it cream or water, you get an aliquot part of each, which when properly tested, will give you a correct estimate of the amount of fat contained in the can. Mr. Carroll will deal with the question of testing, so I need not go into that, but a word about the sample after it is taken. If this is put into an open jar it must be tested within a few hours. If it is not convenient to test every day, the sample must be put into a bottle, a few drops of formalin added, and securely corked. If the samples are kept in an open jar for days together, especially in hot

* Paper read at the Thirteenth Annual Conference of the Australasian Butter Factories' Managers' Association, held May, 1906, at Melbourne.

summer weather, a large amount of moisture evaporates, in which case a false estimate of the original fat-contents is obtained.

I have conducted some experiments with the object of discovering to what extent the tests are influenced under these conditions, and found that cream testing 40 per cent. fat when freshly sampled, four days later tested 40 per cent. if kept in a stoppered bottle, and 50 per cent. if kept in an open jar, and in the case of cream with a low fat-contents the difference was much greater owing to a more rapid evaporation of water. This sometimes accounts for the low percentage of over-run that some factories show. The worst feature of this, however, is the fact that suppliers soon find that the more skim milk they leave in their cream, or, in other words, the thinner they separate, the better the returns they receive from the factory, and this further works against the factory, because the lower the test, the more rapidly the cream ripens, and subsequently goes off, the milk coagulates in the cream, and in churning becomes incorporated in the butter, which prevents it from keeping. Also, it is the low test cream that churns in the cans during transit, particularly in the warm weather. We should have a minimum test allowable in cream from the home separator, and this should certainly not be below 40 per cent. of fat. I think most of you will agree with me that the most satisfactory cream is that testing between 45 per cent. and 55 per cent.

Perhaps the worst feature of the home separator system, and I think the one that has worked the most mischief with regard to the average quality of the product from that source, is what may be termed the illicit competition between factories in which the suppliers are absolutely misled as to the quality of the material they are delivering to the factory. Very few farmers are competent to judge the quality of cream or butter, and they have to, or should, be guided by what the factory manager tells them, but if a farmer takes his cream to a factory, and the manager tells him it is second quality, then he takes the same cream away to another factory, and is told that it is "A1, couldn't be improved," which is the farmer to believe? Naturally he is only too pleased to believe the latter, and he goes home satisfied that his system of caring for the cream is correct, and no improvement is effected. On the contrary, he is inclined to be more careless, and particularly is this so when he is paid the same price—I do not say the same amount of money—as those who are taking every possible care, and deliver their cream in good condition. The tendency is for the careful dairyman to become careless when there is no evidence that he reaps any advantage over his careless neighbour. The factory managers who work on those lines—and I know there are some—are making a rod for their own backs, and are a menace to the industry. All those who have the welfare of the industry at heart should work strenuously together to put down this evil.

I cannot pass this question without mentioning what I think will be the salvation of the industry now that the home separator system is spreading to the extent that it is. I refer to the pasteurization of the private separator cream. You may know that this is carried out very extensively by the Colac Company, and with eminently satisfactory results. In fact, cream treated in this way produces practically the same quality of butter as the cream separated from milk delivered to the factories and creameries. It is found that cream two days old can be pasteurized, provided it has been properly cared for, and this in itself

increases the value of it by about ½d. per lb., for by the aid of a pure culture of lactic acid bacillus a choice flavoured, good keeping butter is produced.

CREAM TESTING BY WEIGHT VERSUS MEASUREMENT.*

P. J. Carroll, Dairy Supervisor.

The subject of testing cream by weight has been much in evidence of late. Many factories have already adopted the system, and it is to be hoped that before long all factory managers and boards of directors will see the wisdom of paying for their cream on the results obtained by this method.

It is not my intention to weary you with a number of technical reasons in support of the weight method as against measurement, but merely to bring the matter before the conference, so that those of you (if any) who are not thoroughly conversant with the matter may gather some useful information by the discussion which I trust will follow this paper. You are all aware that at the time of the introduction and general adoption of the Babcock test in Victoria as a means of determining the relative value of different suppliers' milk, very little private cream was dealt with. Since the advent and spread of the home separator, however, some method by which the cream could be tested in the same manner as milk was sought for, with the result that the Babcock test was again employed, the operation varying only to this extent: that instead of testing 17.5 c.c., as was the case with milk, 8.75, or half the quantity was used. The flasks, of course, were of a different sort, being made broader in the neck, so as to accommodate the higher percentages of fat, and graduated accordingly.

It was soon discovered, both here and in other dairying countries of the world, that this method of measuring the samples could not be relied upon, chiefly on account of the wide variation in the fat percentages of the cream delivered, the inclusion of air, and the presence of gas produced by fermentation, all of which cause a wide difference in the weight of a given volume of cream. To these points I will endeavour to direct your attention, and set out as clearly as I can the main reasons why the weighing of samples of cream is the only correct method at present practicable for the estimation of the butter-fat in cream.

It is already understood that, in order to correctly grade the milk flask now in use, some specific weight of material had to be acted upon; 18 grammes was the quantity selected, and this quantity it was found could be delivered by a pipette graduated to hold 17.6 c.c. The scale on the neck of the bottle is marked from 0 to 10 per cent., thus showing that the graduated portion is exactly 1.8 grammes, or 10 per cent. of the 18 grammes. As the specific gravity of butter-fat at about 140 degrees (the correct temperature for reading) is .9, the space occupied by the scale would be 2 c.c.'s. Now, this same rule applies in the case of cream bottles graded up to 30 per cent., only that the space occupied would

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* A paper read at the Thirteenth Annual Conference of the Australasian Butter Factories' Managers' Association, held May, 1906, at Melbourne.

be 6 c.c.'s instead of 2, it being necessary, as I said before, to provide for the higher percentage of fat contained in cream as against milk.

The preceding paragraph was written with the object of placing the system of testing by measurement as clearly as possible before you, so that I may be able to show the error introduced by the adoption of measurement instead of weight. It was found that, as 17.6 c.c. of cream could not be tested without a special outfit, owing to the higher percentage of fat requiring a scale out of all proportion to the size of the present flasks, and to the probability of having to procure a special centrifuge to hold these bottles. It was therefore decided to adopt half the measure of cream, 8.75 c.c., and rinse the pipette with warm water to remove the cream adhering, and to double the result when the test was made to give the true percentage, hence the reason, I believe, for the use of the 8.75 c.c. pipette for cream testing.

To illustrate the different specific gravity of cream of varying fat percentages, I have prepared the following table, setting out the different features, and showing the approximate loss when samples are measured instead of weighed:—

Specific Gravity 62 F.	Per Cent. Fat in Cream.	Weight Delivered by 17·6 pipette.	Readings by Measurement.	Readings too Low.	Errors in 100 lbs. Fat.
				Per Cent.	
1·008	20	17·3	19·3	·7	3·5
1·002	25	17·2	23·8	1·2	4·8
·996	30	17·0	28·4	1·6	5·3
·980	35	16·4	32·0	3·1	9·1
·966	40	16·3	36·2	3·8	9·5
·950	45	16·2	40·5	4·5	10·
·947	50	15.8	44·	6·	12·

In order to reduce the foregoing to practical working, we will assume that two suppliers, Jones and Thompson, were delivering cream to the factory. Jones' cream tested 30 per cent. by measurement, and Thompson's 50 per cent. Jones delivered 560 lbs. of cream testing 30 per cent. and was paid for 168 lbs. fat; Thompson delivered 336 lbs. cream, testing 50 per cent., and was paid for 168 lbs. fat. If both samples of cream were weighed, the result in fat would be—Jones' test, 31.6 per cent., equals 177 lbs. fat; Thompson's test, 56 per cent., equals 188 lbs fat; or an increase in Jones' case of 9 lbs. of fat, representing over 5 per cent., and in the case of Thompson 20 lbs. fat, representing 12 per cent. increase on the total fat.

COMPARISON.

—	Lbs. Cream.	Test by Measure.	Lbs. Fat.	Test by Weight.	Lbs. Fat.
Jones	560	30	168	31·6	177
Thompson	336	50	168	56	188

The error in Jones' case amounts to 9 lbs. fat, representing 5·3 per cent.; and in Thompson's case 20 lbs. fat, representing 12 per cent.

It will be seen from the above that if Jones' and Thompson's fat is calculated on the measurement basis, it would pay Thompson handsomely to reduce his cream to the same fat percentage as Jones', for in every 100 lbs. fat delivered he would make a gain of close on 7 per cent. On the other hand, when commercial butter is paid for, and the surplus divided equally on the fat basis, Thompson would be penalized to the extent of 6 lbs., and Jones would benefit to the extent of 6 lbs. at Thompson's expense—that is, Jones should have been paid for only 204 lbs. commercial butter instead of 210, and Thompson should have been credited with 216 lbs. commercial butter, instead of only 210 lbs.

—	MEASUREMENT.			WEIGHT.		
	Lbs. Fat by Measure.	Per Cent. Overrun.	Lbs. Com. Butter.	Lbs. Fat.	Per Cent. Overrun.	Lbs. Com. Butter.
Jones	168 plus	25	210	177	15	204
Thompson ...	168	25	210	188	15	216
			420			420

Jones gains 6 lbs. commercial butter on the transaction, and Thompson loses 6 lbs. in the same calculation, owing to the error introduced in the measuring of samples for testing instead of weighing.

So much for the difference in fat percentages and inclusion of air in cream. There is yet another reason to account for, and that is the gas produced through fermentation. As you are all aware, gas will not weigh when placed on the scales, but will cause displacement in a volume, and render the act of measuring under such conditions unreliable. The table of specific gravity and weights delivered by a 17.6 pipette of such creams, whilst not the result of local experiments, is based on numerous tests conducted by Professor Farrington, of the Wisconsin Dairy School. These are borne out fairly well by several sets of experiments carried out by myself and other officers of the Department, one of which is shown in the following table of readings:—

No.	Weight.	Weight.	Measure.	Readings too low by Measure.	Actual Per Cent. in 100 lbs. fat.
1	16	...	15·5	·5	3
2	19	19	18	1	5¼
3	19	...	18	1	5¼
4	19·5	19·5	18·5	1	5
5	20·5	21	19·5	1·25	6
6	21	..	19	2	9¼
7	21	21	19	2	9½
8	21·5	21	20	1·4	6½
9	22	22	20	2	9
10	22	22	19·5	2·5	11½
11	26·5	26	23·5	3·25	12
12	26·5	...	23	3·50	13¼

It can plainly be seen that, both in theory and practice, measuring cream for calculating its butter-fat results is absolutely wrong, and it requires no further words of mine to convince you of the importance of at once discarding a method which is so palpably unfair and inequitable. I will, however, read another table in order to illustrate the effect when several suppliers' creams, ranging from 20 to 50 per cent. fat, are being treated; each delivered the same quantity of fat, but a different return is given owing, of course, to the error introduced by measurement.

No.	Weight of Cream.	Per Cent. of fat in 18 grs.	Per Cent. given by 17·6 c.c. pipette.	Error in Reading.	Actual fat Content of Cream.	Total fat paid for.
	lbs.					
1	500	20	19·3	·7	100	96·5
2	400	25	23·1	1·2	100	95·2
3	334	30	28·4	1·6	100	94·8
4	286½	35	32	3	100	91·6
5	250	40	36·2	3·8	100	90·5
6	222½	45	40·5	4·5	100	90·1
7	200	50	44	6	100	88

NEW ZEALAND FLAX.

(Phormium Tenax.)

Joseph Knight.

This useful and most profitable plant has been brought most prominently before the Victorian public recently by a Mr. Tait, who has an invention which is said to be a new method of extracting the fibre. As an effort has been made to float a company to work the same, considerable inquiries have been made for particulars as to what the plant consists of.

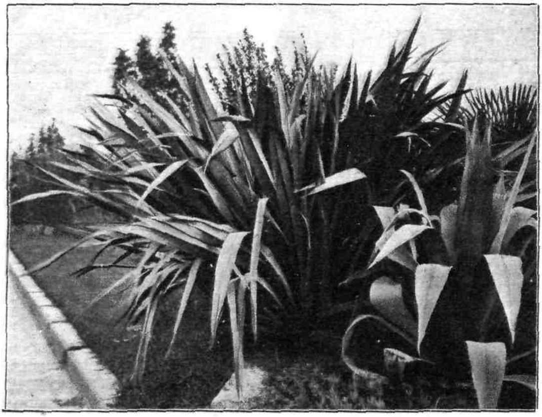
It is somewhat surprising the confusion that exists in the minds of many as to what constitutes New Zealand flax, and flax produced from the plant *Linum usitatissimum*. These plants differ so widely that I think it is advisable to reproduce illustrations of each, so that they may be identified. As the *Linum*, which was dealt with in the last issue of the *Journal*, is now favorably and well known in the State, and need not be further referred to, the only object in writing this brief treatise is to place a few facts before those who may be interested in *Phormium tenax*. The plant is well known in Victoria, and may be seen growing in most of our gardens. It is the principal plant employed for filling up all new plantations along streets, as it is hardy, and thrives well under most conditions.

The Agave varieties, which produce the well-known Aloe fibre, are also confused with the *Phormium tenax*. A specimen plant is shown in the accompanying illustration. It will be readily recognised, as many varieties may be seen growing in yards and elsewhere.

NATURE OF THE PLANT.

Sir James Hector, in his valuable publication on *Phormium tenax*, which has passed through several editions, gives the following description. I am also indebted to this publication for the illustration of the sections of the root-stalk and other information:—

"*Phormium tenax*, belonging to the Silaceous family of plants, was first mentioned as occurring in New Zealand by Captain Cook, who says: 'The country produced a grass plant, like flags, of the nature of hemp or flax, but inferior in quality to either. Of this the natives make clothing, lines, nets, &c.' Royle states that 'the leaves of the plant are perennial,



PLANTS OF PHORMIUM TENAX AND AGAVE.

(The Agave is on the right side of the illustration.)

hard, sword-shaped, and from 5 to 7 feet in length, with a flower-stalk rising 4 feet or 5 feet above them, and bearing a profusion of flowers, followed by triangular seed vessels, filled with flat and thin black shining seeds. It was introduced in the year 1798 into the South of Ireland, and has been found to flourish on the west coast of Scotland, though European winters are occasionally too severe for it.'

This general description applies to the Phormium plant wherever it grows in New Zealand and Norfolk Islands, to which countries its natural range is confined; but it presents many minor variations in habit of growth, according to the climate and soil. These differences are not, however, so great as might be expected to occur in a succulent plant that ranges through 18 degrees of latitude, or from almost a tropical, insular climate to a country possessing a severe winter climate, with prolonged frosts and snowstorms."